

PEARSON

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Published April 24, 2008

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ADP users call 1-866-688-9555

Maryland users call 1-888-639-0690

Virginia users call 1-866-650-9425

(Eastern) Monday-Friday, 7:00 a.m. – 8:30 p.m.

(Central) Monday-Friday, 6:00 a.m. – 7:30 p.m.

(Mountain) Monday-Friday, 5:00 a.m. – 6:30 p.m.

(Pacific) Monday-Friday, 4:00 a.m. – 5:30 p.m.

Pearson continually monitors and evaluates the recommended hardware and software requirements for TestNav. As vendors release newer versions of their products, we update the recommended hardware and software requirements accordingly.

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1.0 Who Should Use This Guide

Welcome to *TestNav Technology Guidelines*. This document is intended primarily for network or IT personnel who are responsible for setting up and configuring a school's test delivery environment prior to online testing. Topics covered include:

- Hardware and software requirements
- TestNav installation
- Network connectivity
- Intermediate network devices
- Other test delivery considerations
- Readiness checklist

Note: This document provides guidelines for computers and networks used for delivering online tests to students. Computers used for test administrative tasks by educators (teachers, test administrators, test monitors, etc.) within the PEMSolutions portal have their own set of technology guidelines (see *PEMSolutions Technology Guidelines* on the PEMSolutions Support > Resources screen).

2.0 Key Terms

There are several terms used throughout this document that have a specific meaning with regard to TestNav technology requirements.

- **Test Delivery Workstations** are used to deliver tests to students. Students access online tests by means of TestNav™, our proprietary test delivery application. There are two basic types of test delivery: conventional and media.
- **TestNav** is a client-installed Java application that is used instead of a browser to access the Internet and online tests. TestNav must be installed either on a file server or on each test delivery workstation.
- **Proctor Caching server** is the name for a workstation that has the Proctor Caching software installed on it. Proctor Caching servers pre-cache test content, which accelerates the delivery of test content to students and reduces the amount of bandwidth required for electronic testing.

3.0 Test Delivery Workstations

Test Delivery Workstations are used to deliver tests to students. Students access online tests by means of TestNav, Pearson's proprietary test delivery application. TestNav is a client-installed Java application that is used instead of a browser to access the Internet and online tests. **TestNav does not require a browser.**

Proctor Caching Server is the name for a test delivery workstation that has the Proctor Caching software installed on it. Proctor Caching servers pre-cache test content, which accelerates the delivery of test content to students and reduces the amount of bandwidth required for electronic testing.

Hardware for TestNav Workstations

The minimum and recommended hardware requirements for all TestNav test delivery workstations are listed below.



Windows-based PCs

Minimum	Recommended
<ul style="list-style-type: none">• Pentium III (700 Mhz)• 128 MB RAM• 500 MB Available Disk• Mouse/Pointing Device• Headphones/Speakers• 800 x 600 Screen Resolution	<ul style="list-style-type: none">• Pentium 4• 256 MB RAM• 500 MB Available Disk• Mouse/Pointing Device• Headphones/Speakers• 1024 x 768 Screen Resolution



Apple/Macintosh

Minimum	Recommended
<ul style="list-style-type: none">• Power PC, G3, G4• 128 MB RAM• 500 MB Available Disk• Mouse/Pointing Device• Headphones/Speakers• 800 x 600 Screen Resolution	<ul style="list-style-type: none">• G4 (700 Mhz) or G5• 256 MB RAM• 500 MB Available Disk• Mouse/Pointing Device• Headphones/Speakers• 1024 x 768 Screen Resolution

Operating Systems for Test Delivery (including Proctor Caching)

This section lists the operating systems that Pearson recommends for test delivery workstations running TestNav and Proctor Caching server applications.

- **TestNav** is a locally installed Java application that delivers a test to students. (See Section 4.0 for TestNav installation instructions.)
- **Proctor Caching server** is the name for a workstation that has the Proctor Caching software installed on it. Proctor Caching server pre-caches test content, which accelerates the delivery of test content to students and reduces the amount of bandwidth required for electronic testing. (For further Proctor Caching configuration guidelines, refer to the *Proctor Caching User's Guide* located on your PEMSolutions Support page (Support > View All Resources > User Documentation.)

Recommendation: Freezing your online testing environment

Pearson strongly recommends that once you have certified that TestNav works in your environment, you “freeze” your online testing environment during scheduled testing windows. This means that you should not implement hardware or third-party software updates or auto-updates (*especially Safari, Java Virtual Machine, and Flash Player*) during an online testing administration.

- To disable the auto-update notifications for Safari and JVM, see instructions in the Apple Software Updates section.
- To disable the auto-update notifications for Flash Player, see instructions in Flash Player Software Updates section.

Windows Operating Systems for Test Delivery

This list shows the required Windows operating systems for workstations running the TestNav test delivery application or serving as a Proctor Caching server.



Windows OS for Test Delivery Workstations

- Windows 2000 (Service Pack 4)
- Windows XP (Service Pack 2)
- Vista¹

¹If you are delivering Flash-based items with Vista, see the instructions for Vista firewall settings below.

¹Vista Firewall Settings for Flash-based test delivery


Note: This applies only if you are delivering Flash-based test items on machines running the Vista operating system. Virginia does not use Flash-based items.

A security setting within Vista may not allow Flash items to display properly, or even cause the test session to end prematurely. **To allow Flash delivery on Vista machines, the *javaw.exe* file must be listed as an exception in the Windows Firewall Settings.**

1. Open the Windows Control Panel.
2. Go to Security Center > Windows Firewall > Change Settings > Exceptions.
3. See whether *javaw* or *javaw.exe* are listed.
4. If either *javaw* or *javaw.exe* file is listed, make sure that the checkbox is selected for the file. The “checked” checkbox marks the file as an exception.
5. If neither *javaw* nor *javaw.exe* are listed, click **Add Program** and browse to *javaw.exe* in your TestNav directory (typically the file is in *C:\program files\testnav\jre\bin\javaw.exe*)
6. After locating the file, double-click the **javaw.exe**. The file will then be added to the list in the Exceptions dialog box and should be in “checked” status (which marks it as an exception in the firewall settings).

Apple/Macintosh Operating Systems for Test Delivery

This list shows the required Macintosh operating systems for workstations running the TestNav test delivery application or serving as a Proctor Caching server

	Macintosh OS for Test Delivery Workstations
<ul style="list-style-type: none">• Mac OS X 10.3• Mac OS X 10.4 (PowerPC and Intel)• Mac OS X 10.5*	
Note: If you are delivering Flash-based items on a Mac, please review the more detailed table below that lists the supported JVMs.	
* Mac OS X 10.5 should NOT be used for test delivery in Virginia because it is not compatible with Virginia’s version of TestNav.	

Apple Software Updates

Pearson strongly recommends that the Apple Software Update function be disabled during test delivery windows.

A Safari auto-update or a JVM auto-update can potentially negatively affect the TestNav test delivery engine. (Although TestNav does not require a browser, TestNav can be affected by Webkit, which is a component of Safari.)

If you do not want Apple to automatically notify you when a software update is available, go to Settings > Software Update and deselect Check For Updates.

Apple/Macintosh Operating Systems for Flash-based Test Delivery

This table shows the Macintosh operating systems and associated JVMs that support Flash delivery.

Macintosh OS for <u>Flash-based</u> Test Delivery Workstations			
Mac OS X Release	Java Release	java.version	java.runtime.version
10.3.9	1.4.2	1.4.2_03	1.4.2_03-117.1
	1.4.2 Update 1	1.4.2_05	1.4.2_05-141
	1.4.2 Update 2	1.4.2_05	1.4.2_05-141.3
	Security Update 2005-002	1.4.2_05	1.4.2_05-141.4
	Java Security Update (4.0)	1.4.2_09	1.4.2_09-233
	Update 5	1.4.2_12	1.4.2_12-269
10.4.0 – 10.4.11	-	1.4.2_07	1.4.2_07-215
	1.3.1 and 1.4.2 Release 2	1.4.2_09	1.4.2_09-232 (Power PC) 1.4.2_09-239 (Intel)
	Release 5	1.4.2_12	1.4.2_12-269
	Release 6	1.4.2_16	1.4.2_16-b05-303
10.5	-	1.4.2_16	1.4.2_16-b05-302

Flash Player requirement for Flash-based test delivery (PC and Mac)

If you are delivering Flash-based test items, Adobe Flash Player 9 must be installed on each test delivery workstation (PC and Mac), even when TestNav is a server-based install.

Flash Player Software Updates

Pearson strongly recommends that the Flash Player update function be disabled during test delivery windows.

A Flash Player update can potentially negatively affect the TestNav test delivery engine by updating Flash Player to a new version unsupported by Pearson.

If you do not want Adobe to automatically notify you when a new version of Flash Player is available, go to the Flash Player Global Notifications Settings panel and deselect Notify Me When An Update Is Available.

4.0 Downloading and Installing TestNav

Students access the tests by means of TestNav, our test delivery application. TestNav is used instead of a browser to securely access test content.

Downloading TestNav

1. Go to your testing program's PEMSolutions Support page to access the TestNav download links (Support > View All Resources > Downloads).
2. Click the appropriate link (PC or MAC) to download the TestNav application to your workstation.
 - After downloading TestNav, make note of the name and location of the downloaded file on your workstation.

Installing TestNav

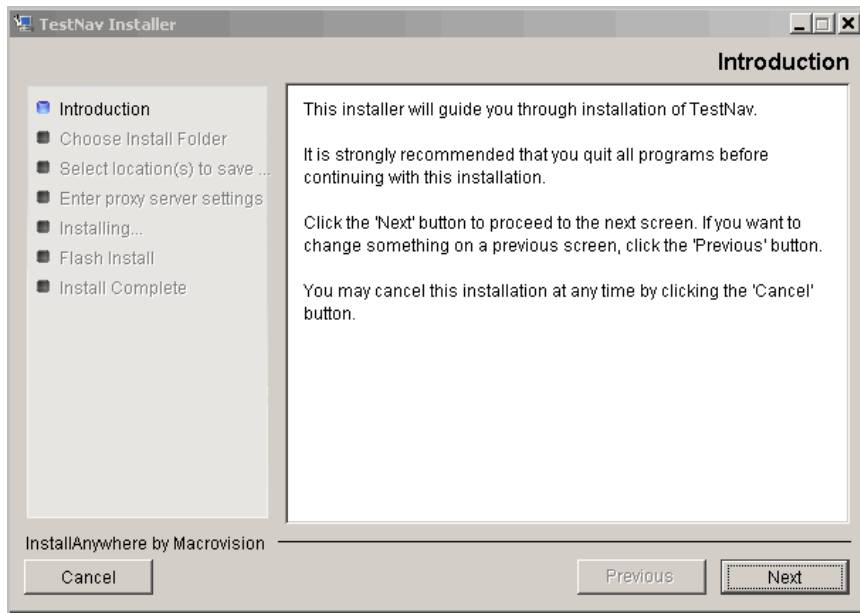
Pearson recommends that TestNav be installed on a file server within your LAN environment, and that shortcuts to TestNav be placed on each test delivery workstation. (**Note:** If you are delivering Flash-based test items, Adobe Flash Player 9 must be installed on each test delivery workstation (PC and Mac), even when TestNav is a server-based install.)

If you install TestNav on a file server, any changes to TestNav (for example, changing proxy settings) can be made on one workstation rather than multiple workstations.

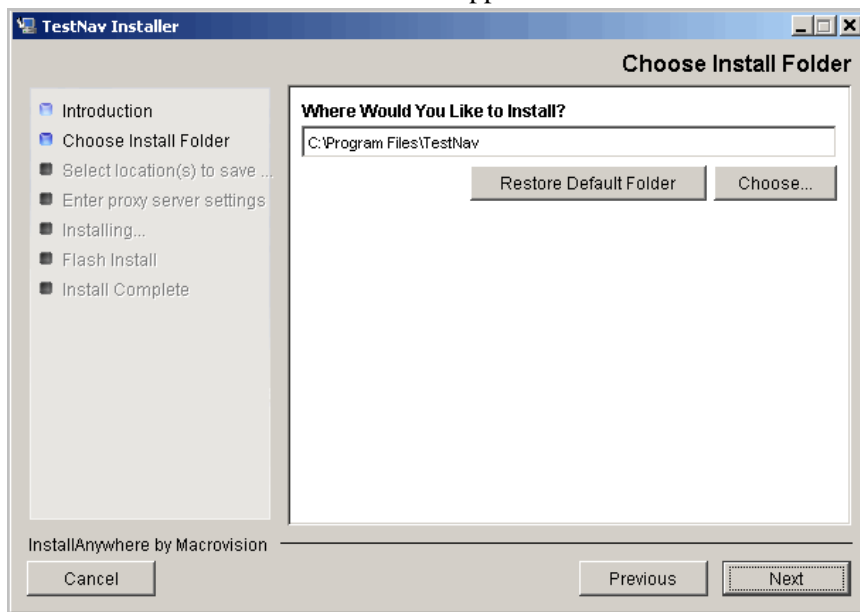
File Server Installation

- When installing TestNav to a file server, you must ensure that clients refer to the TestNav installation consistently. If a drive mapping is used, all clients must use the same drive mapping (e.g., t:\testnav) to access the TestNav application. TestNav must be installed using the same mappings that clients will use to access the program. (Note that Novell file servers typically use file mapping.)
- To ensure a consistent installation, install TestNav to the file server from the client workstation. To do this, access the shared drive on the server from the client workstation and execute the installation file.
- **If you do not install TestNav on a file server, you must install TestNav on each workstation used to deliver tests to students.**

3. Go to the downloaded TestNav application on your client workstation and double-click the **TestNav** application. The Introduction screen will open.

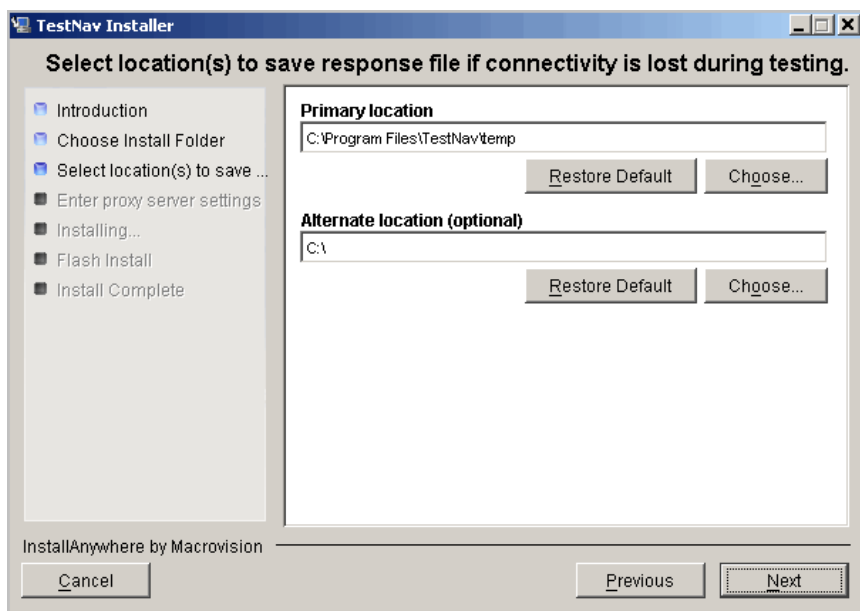


4. Read the instructions, and then click the **Next** button. The Installation Folder screen opens and the default installation folder will appear in the text box.



You can either enter the designated UNC path (e.g., \\servername\shared_location\TestNav) and mapped drive (e.g., t:\TestNav), or you can click **Choose** to access the shared drive and the location you want to choose as your new TestNav installation folder.

5. After choosing the shared TestNav installation folder, click **Next** to open the Select Response File Save Location screen.



Selecting Response File “save” Locations

The TestNav Early Warning System (EWS) is designed to help save student responses locally in the event of a network interruption. EWS saves the student's responses to an encrypted backup file so the student can either continue testing or exit the system without losing data. This activity occurs in the background of the test delivery software while the software continues to provide test questions to the student.

Selecting response file “save” locations

- You must select a primary save location when installing TestNav.
- Selecting an alternate save location is recommended, but optional.

By designating a file save location, you are stipulating where a student's responses will be saved locally if the connection to the testing server is interrupted. The default primary save location is:

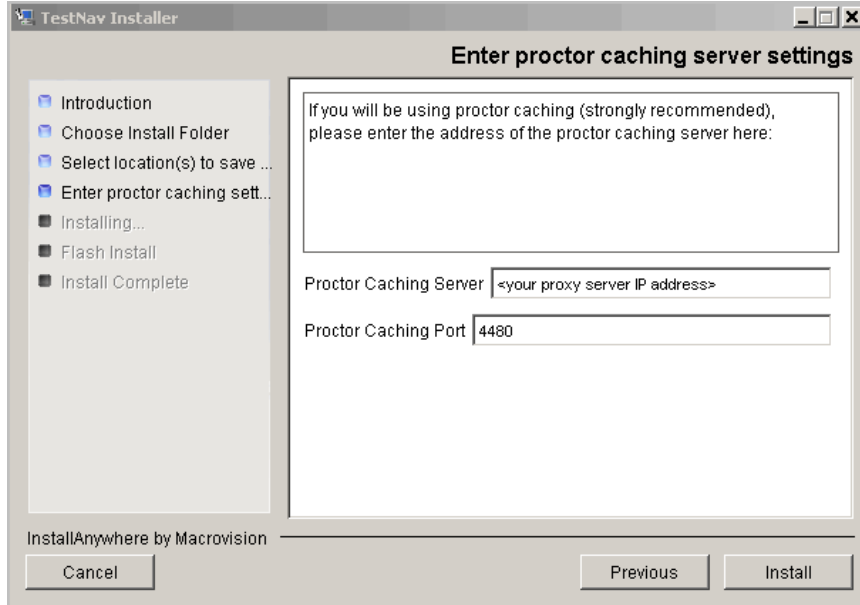
`\servername\shared_location\TestNav\temp`

The save location for the response file must be a location to which all clients of that server have read and write access.

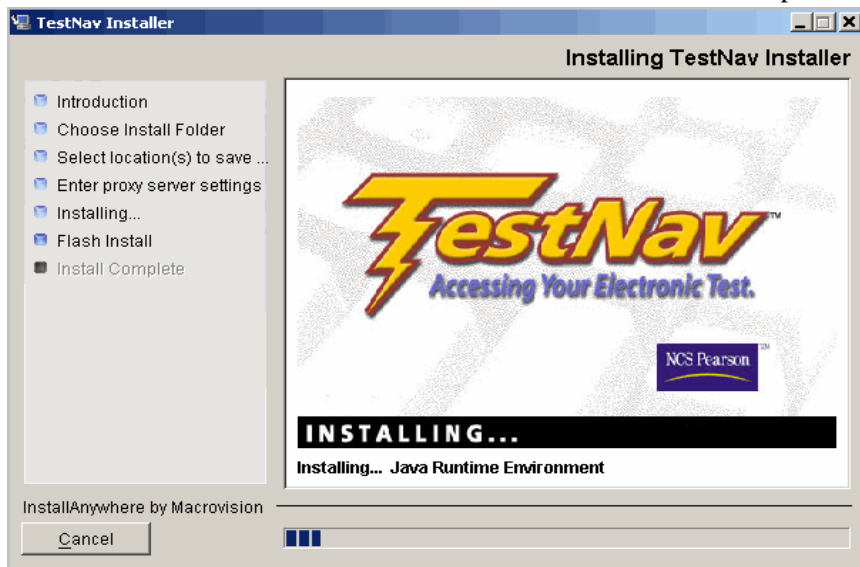
Alternate save location (optional) - If you use the alternate default location, the clients will save responses locally on their C:\drive, not on the C:\network drive. Therefore you must ensure that the students have write access to that particular location, otherwise responses will not be saved and you will receive an error message. Change this default location to another location on the shared drive if you don't want responses saved locally on the client.

For more information about the EWS, see the *TestNav Early Warning System Reference Manual* on your PEMSolutions Support page (Support > View All Resources > User Documentation).

6. After selecting a save location, click **Next** to open the Enter Proctor Caching Server Settings screen.



- If you are not using proctor caching, you need not enter the server address or proxy port number on this screen. Leave the boxes blank and click Install to continue the TestNav install.
 - If you are using proctor caching, fill in the proxy server address and proxy port 4480. Then click Install to continue the install.
7. Click the **Install** button to continue the TestNav installation and open the Installer screen.



Adobe Flash Player

If TestNav detects that Flash Player 9 is not installed, the Flash Player install wizard will launch. Click **Install** to continue.



If you are delivering Flash-based test items, Adobe Flash Player 9 must be installed on each test delivery workstation (PC and Mac), even when TestNav is a server-based install.

8. After installation of TestNav is complete, a confirmation screen will open.

TestNav Installation Notes

Adding a shortcut to TestNav on each client workstation.

Pearson recommends that shortcuts to *TestNav.exe* be placed on each client workstation, and that the *TestNav.exe* shortcut icon to the *TestNav.ico* shortcut icon on the desktop. (Students need read access to the TestNav directory.)

1. Right-click the **TestNav.exe** shortcut icon on your desktop.
2. Select “Properties” on the bottom of the list.
3. Click the **Change Icon** button on the bottom right to open the Change Icon window.
4. Click the **Browse** button.
5. Search the TestNav directory to find and select the *TestNav.ico* icon.
6. Click the **Open** button.
7. Click **OK** in the Change Icon window.
8. Click **OK** in the Shortcut to TestNav.exe Properties window. The TestNav.exe shortcut icon on your desktop will change to the regular TestNav icon.
9. Rename the icon from “Shortcut to TestNav.exe” to “TestNav.”



TestNav Logging

TestNav client logging is enabled by default by creating a directory called “Logs” within the TestNav directory. TestNav client logging captures the current system output and error messages. Should an incident occur, our technical support team has access to more complete diagnostic information that will help us to troubleshoot the issue and take further steps to remedy the problem.

When installing TestNav on a file server (or an individual workstation), you must ensure that the workstation has write access to the directory to which TestNav writes its logs. (If the student does not have write access, then no log is generated.) You should allocate approximately 10 KB disk space per student available to accommodate the log files.

- If TestNav shuts down successfully, the log file will be automatically removed from the system.
- If TestNav does not shut down successfully and student responses are potentially lost, call the Pearson Support Center toll free for instructions on retrieving the log file.

ADP users call **1-866-688-9555**
Maryland users call **1-888-639-0690**
Virginia users call **1-866-650-9425**

(Eastern) Monday-Friday, 7:00 a.m. - 8:30 p.m.
(Central) Monday-Friday, 6:00 a.m. - 7:30 p.m.
(Mountain) Monday-Friday, 5:00 a.m. - 6:30 p.m.
(Pacific) Monday-Friday, 4:00 a.m. - 5:30 p.m.

Server-based vs. Local Install of TestNav

Pearson recommends that TestNav be installed on a file server whenever possible. The chart below lists the pros and cons of a server-based versus a local install of TestNav.

	Pros	Cons
Server	<ul style="list-style-type: none">+ Single point of installation and configuration changes+ Easier to implement in a large-scale testing environment+ Centralized location for log files	<ul style="list-style-type: none">– Adds a potential point of failure
Local	<ul style="list-style-type: none">+ Quicker launch time+ Eliminates server as potential point of failure	<ul style="list-style-type: none">– Increases installation time (Note: System automation tools, such as SMS (Windows) and Apple Remote Desktop (Mac) can make local installs much easier)– Requires that configuration changes be made on each machine

Launching TestNav

1. When students take a “live” test online, TestNav is launched by clicking on the TestNav icon on the desktop.
2. To access the test, the student enters (or selects) the URL from the Student Authorization Letter (Test Ticket) in the TestNav address field, and then clicks **Go**.



Enter (or select) the URL from the Student Authorization Letter (Test Ticket)

Note: The letters at the end of the URL after the “/” (e.g., VAP) refer to your testing program. Be sure to enter the URL exactly as printed on the Student Authorization Letter.

If your school is using **Symantec Web Security** as an Internet content filter AND has it configured to require individual user authentication, follow these steps for launching TestNav:

1. Open an industry-standard browser.
2. Login to Symantec Web Security.
3. Keep the browser open.
4. Launch TestNav.

TestNav Auto Update

If TestNav is already installed and the system detects that your TestNav version needs to be updated, a pop-up message will be displayed.

1. Click **OK** to start the automatic TestNav update. A “Loading” pop-up will indicate that the TestNav update is in progress.
 - When the Loading pop-up disappears, your TestNav has been successfully updated and the TestNav login screen will be displayed.
2. Log in to TestNav.

Note: Administrator privileges to the TestNav directory are required in order to successfully install the TestNav auto update.

5.0 Configuring Other Applications

Applications that Launch Automatically

The TestNav delivery engine does not permit access to other desktop applications (including applications that may be launched automatically) without terminating the test.

Any applications that may automatically launch on a computer should be configured not to launch during testing sessions. Common applications that may launch automatically include:

- Anti-virus software performing automatic updates
- Power management software on laptops warning of low battery levels
- Screen savers
- E-mail with auto message notification

Other Applications and Processes

To ensure maximum reliability, performance, and security during testing, we **strongly recommend** that only those applications and processes needed for online testing be running on test delivery workstations before TestNav is launched.

Pearson strongly recommends that once you have certified that TestNav works in your environment, you “freeze” your online testing environment during scheduled testing windows. This means that you should not implement hardware or third-party software updates or auto-updates (*especially Safari, Java Virtual Machine, and Flash Player*) during an online testing administration.

- To disable the auto-update notifications for Safari and JVM, see instructions in the Apple Software Updates section.
- To disable the auto-update notifications for Flash Player, see instructions in Flash Player Software Updates section.

6.0 Network Connectivity

All communications for administrative tasks and test delivery occur via TCP/IP. All workstations must have TCP/IP installed and the network must be capable of routing traffic to the Internet. Prior to testing, an analysis should be performed to determine whether network bottlenecks exist and at what level of usage they potentially will impact testing.

The protocol/port combinations used by PEMSolutions are:

Protocol/Port	Function
http/80	Test Delivery and Administrative workstations
https/443	Administrative workstations

In general, the amount of bandwidth required for a given environment will be dependent on 1) the number of students testing simultaneously, 2) the size of test being administered, 3) Internet caching, and 4) WAN topology.

As a rule of thumb, testing will require a minimum of 6 Kilobits/second of network bandwidth end-to-end for each user.

This is the minimum bandwidth; additional bandwidth will speed the test delivery process. Note that this bandwidth **requirement** assumes linear (not adaptive) test delivery with traditional test items. Delivery of media files, for example, significantly increases bandwidth consumption and requires greater network bandwidth.

The 6 Kilobits/second represents the amount of bandwidth available versus leased. For example, if a school district has a 1.54 Mb/s connection to the Internet, but it is 50% busy prior to testing, testing should have 512 Kb/s available for the entire district. Content caching servers (i.e., Proctor Caching) can significantly reduce the amount of bandwidth required when implemented correctly.

Local Area Network (LAN)

PEMSolutions products are not dependent on the type of LAN technology used. Token Ring, Ethernet, and Wireless Ethernet (802.11b) are all known to work well. Most LANs run at speeds of 10 Mb/s or greater. This should be sufficient bandwidth on the LAN for testing, assuming that the LAN is not already congested.

Wide Area Network (WAN)

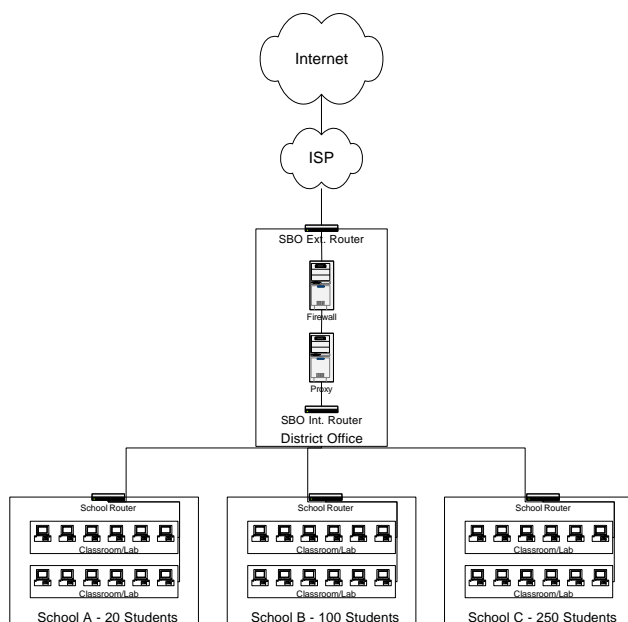
PEMSolutions products are not dependent on the type of WAN technology used. However, bandwidth should be carefully reviewed for all WAN links to ensure that each examinee workstation has a minimum of 6 Kilobits/second available during testing sessions.

Internet Connectivity

Internet connectivity is the most common bottleneck when delivering tests. The amount of connectivity to the Internet is dependent on the total number of requests that the Internet connection must service in a given time period.

When determining how much Internet bandwidth will be needed for electronic testing, it is important to consider the total number of students accessing the Internet concurrently in a given testing session. Many school districts share a common connection to the Internet and therefore must size the Internet connection appropriately to handle all concurrent testing across the district. Again, the rule of thumb is 6 Kilobits/second per student.

The schematic on the following page shows a district's Internet connection that is shared by three schools connected through the district office.



School A anticipates 20 students testing simultaneously, School B anticipates 100 students, and School C anticipates 250 students. To calculate required bandwidth from school to district office for each school in this district, multiply the number of students testing simultaneously by 6 Kilobits/second per student. For example:

School	# Students x 6 Kb/s Per Student	Total Bandwidth
School A	20 students x 6 Kb/s per student =	120 Kb/s
School B	100 students x 6 Kb/s per student =	600 Kb/s
School C	250 students x 6 Kb/s per student =	1,500 Kb/s
School District	370 students x 6 Kb/s per student =	2,200 Kb/s

Thus, the bandwidth required from the district office to the Internet is the sum of the bandwidth requirements for each school within the district (2,200 Kb/s).

Wireless Testing

PEMSolutions products will run successfully in a healthy wireless lab environment.

7.0 Intermediate Network Devices

This section presents guidelines for schools using firewalls, proxy servers, and Internet caching for TestNav test delivery.

Firewall

If there is a firewall between the workstations being used for electronic testing and the Internet, the following destination/protocol/port combinations must be allowed through the firewall:

✓	Domain Name	IP Address	Protocol/Port
	etest.Pearson.com	206.17.160.33	TCP/http port: 80
	www8.etest.Pearson.com	206.17.160.38	TCP/https port: 443
	www9.etest.Pearson.com	206.17.160.37	TCP/http port: 80
	launcher.etest.Pearson.com	206.17.160.37	TCP/http port: 80
	www.pearsonaccess.com	206.18.174.15	TCP/http port 80 TCP/https port 443

Proxy Servers/Content Filtering

The following URLs must not be blocked on any proxy servers or by any software that is used for Internet content filtering:

	etest.Pearson.com
	www8.etest.Pearson.com
	www9.etest.Pearson.com
	launcher.etest.Pearson.com
	www.pearsonaccess.com

Proxy Environments

Many school districts use proxy servers in their network environments. Proxy servers are placed between client nodes and the Internet and are used to forward requests from internal nodes to the Internet. Proxy servers may perform some or all of the following functions:

- *Protocol Filtering* to control which protocols are forwarded to the Internet
- *User Authentication* to control who can access the Internet
- *Machine Authentication* to control which workstations can access the Internet
- *Content Filtering* to control which Internet content users can access
- *Content Caching* to speed access for frequently visited sites

In order for an application to access the Internet in a proxy server environment, the application must know the hostname and port number of the proxy server. Once the application is made aware of the proxy server, it sends all requests for network services to the proxy server for processing. The proxy server receives the incoming requests and must determine what to do with them. If all of the functions listed above have been implemented, the proxy server will:

- Verify that the protocol of the request is serviceable (e.g., ICMP, UDP, etc., may be blocked by the proxy server).
- Ask the user to authenticate that the proxy server does not already recognize him/her as being logged in.
- Verify that the source address of the request is on the list of allowed workstations.
- Verify that the requested network object is not blocked by an Internet content filter. (Most Internet content filter vendors provide lists of sites organized by category that administrators can decide to block or allow.)
- Check the proxy server's local disk to see whether the requested object exists in cache. (If the object is in cache, the proxy server will send it directly to the requestor without having to access it from the Internet.)

Assuming that the request passes all of the above steps, the proxy server then stores a record of the request in memory and issues its own request for the same object out to the Internet. When the reply returns to the proxy server, the server matches the reply to the original request stored in memory and forwards the reply to the original requestor.

Configuring a Proxy Environment for TestNav

- **Protocols:** TestNav uses the same protocol to communicate on the Internet as a web browser: TCP/http. Proxy servers and firewalls must be configured to allow http on port 80 to the Internet.
- **User Authentication:** If user authentication is enabled on a proxy server or firewall, the session timeout value should be set to at least be equal to the length of the test. This will help prevent users from losing their session with the proxy server or firewall while taking a test.
- **Machine Authentication:** If machine authentication is necessary, all workstations running TestNav must be recognized by the proxy server as valid clients.
- **Content Filtering:** The following URLs must be allowed through any content filters that have been implemented:

	etest.Pearson.com
	www8.etest.Pearson.com
	www9.etest.Pearson.com
	launcher.etest.Pearson.com
	www.pearsonaccess.com

- **Name Resolution:** TestNav uses DNS to resolve the above hostnames to IP addresses when communicating. Clients must be able to query DNS to resolve the hostnames listed above. If there are problems with DNS functioning correctly, a local host's file can be used with the following entries:

	etest.Pearson.com	206.17.160.33
	www8.etest.Pearson.com	206.17.160.38
	www9.etest.Pearson.com	206.17.160.37
	launcher.etest.Pearson.com	206.17.160.37
	www.pearsonaccess.com	206.18.174.15

8.0 Readiness Checklist

√	Requirement	Section
	Hardware requirements have been satisfied.	3.0
	Operating system requirements for test delivery workstations running TestNav have been satisfied.	
	TestNav is downloaded, installed, verified, and accessible.	4.0
	TestNav workstations have read and write access to the logs directory to which TestNav writes its logs.	
	Test delivery workstations have read and write access to the chosen file save locations.	
	Adobe Flash 9 installed on each machine used to deliver Flash-based items (even if TestNav is installed on a server).	
	Automatic notification when a new version of Flash Player is available has been disabled.	
	Automatic notification when a new version of Safari or JVM is available has been disabled.	5.0
	Applications that could launch automatically have been disabled on all workstations running TestNav.	
	Test delivery workstations are running only those applications and processes needed for online testing before TestNav is launched.	6.0
	Client workstations have TCP/IP installed and the network is capable of routing traffic to the Internet.	
	A minimum of 6 Kilobits/second per student of network bandwidth is available.	7.0
	If there is a firewall between the workstations being used for electronic testing and the Internet, ALL destination/port/protocol combinations are allowed through the firewall.	
	Clients are able to query DNS to resolve hostnames.	
	URLs are allowed through Internet content filters.	

9.0 Recent Document Updates

This list shows the recent updates to the TestNav Technology Guidelines. (The most recent updates are listed first.)

April 24, 2008	<ul style="list-style-type: none"> Added a statement that VA does not use Flash to the section titled “Vista Firewall Settings for Flash-based test delivery”. Added the recommendation to freeze the online test environment during scheduled testing windows to the section titled “Other Applications and Processes”.
April 17, 2008	<ul style="list-style-type: none"> Added recommendation that once you have certified that TestNav works in your environment, you “freeze” your online testing environment during scheduled testing windows. Added recommendation to disable Safari and JVM auto-updates during testing window on Test Delivery workstations. Added recommendation to disable Flash Player auto-updates during testing window on Test Delivery workstations.
March 14, 2008	<ul style="list-style-type: none"> Updated Pearson Support Center phone information. Noted that Mac OS X 10.5 test delivery workstations should not be used in Virginia because they are not compatible with Virginia’s version of TestNav. Added the pearsonaccess.com domain to the Intermediate Network Devices section.
January 24, 2008	<ul style="list-style-type: none"> Removed G5 from the Apple/Macintosh minimum hardware requirements for all TestNav test delivery workstations. Modified the recommended hardware for Apple/Macintosh from “G4 or G5 (700 Mhz)” to “G4 (700 Mhz) or G5” Removed Windows 2003 from the list of supported Windows OS test delivery workstations. Added Mac OS X 10.5 to the list of supported test delivery workstations. Note: MAC OS X 10.5 should not be used in Virginia because it is not compatible with Virginia’s version of TestNav. Updated the Macintosh JVMs that support Flash-based test delivery workstations.
January 3, 2008	<ul style="list-style-type: none"> Noted that TestNav auto updates require administrator privileges to the TestNav directory. Added wireless testing section.
October 11, 2007	<ul style="list-style-type: none"> Deleted note about Java 1.5 for Flash-based test delivery on Mac.
September 28, 2007	<ul style="list-style-type: none"> Updated hardware requirements for TestNav workstations. Updated operating system requirements for TestNav workstations. Updated Flash Player requirements for Flash-based testing. Updated TestNav installation instructions.